blueprint

Efficiency Division

SPRING 2000

RESIDENTIAL & NONRESIDENTIAL

QUESTIONS and ANSWERS

RESIDENTIAL

Q *I want to design and provide an energy efficient kitchen. I especially want the lighting design to provide an aesthetically pleasing appearance, sufficient light for basic kitchen tasks, and be energy efficient while also complying with the Energy Efficiency Standards. How can I achieve my goal?*

A Section 150(k) of the 1999 Energy Efficiency Standards for Residential and Nonresidential Buildings (Standards) states:

> "Luminaires for general lighting in kitchens shall have lamps with an efficacy of not less than 40 lumens per watt. General lighting must provide a sufficient light level for basic kitchen tasks and provide a uniform pattern of illumination. A luminaire(s) that is (are) the only lighting in a kitchen will be considered general lighting. General lighting shall be controlled by a switch on a readily accessible lighting control panel at an entrance to the kitchen.
>
> Additional luminaires to be used only for specific decorative effects need not meet this requirement."

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WELCOME

to the new blueprint!

In keeping with the optimism associated with the new century and millennium, we have developed a new format for this publication. We anticipate quarterly publication and encourage you to participate by submitting questions, information or photographs for inclusion in these pages. Our goal is to serve your needs. Please feel free to contact the Hotline or me with comments or questions regarding energy efficiency.

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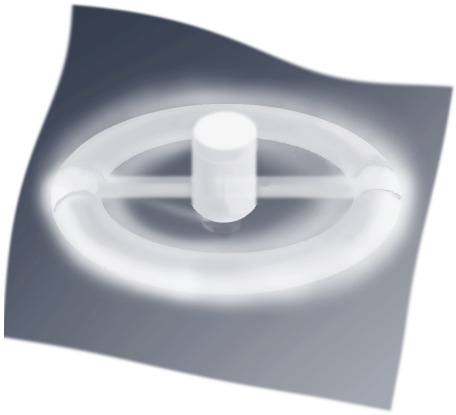

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The intent of the kitchen lighting code is not to increase the number of light fixtures and/or watts used by the occupant but rather to insure the builder provides — and the occupant uses — energy efficient lighting.

General lighting — the lighting that the occupant will typically use on a regular basis — is required to be high-efficacy (normally, fluorescent lighting). "Efficacy" is defined in Section 101(b) of the Standards as, "…the ratio of light from a lamp to the electrical power consumed (including ballast losses) expressed in lumens per watt."

Section 150(k) requires that the general lighting be switched at the kitchen entrance. It also emphasizes that the high-efficacy lighting must provide sufficient light level for basic kitchen tasks and that this lighting must be uniform. The fluorescent fixtures installed may be of varying designs and shapes (i.e., recessed or surface mounted four-foot long tubes, round circline style with flat or convex plastic or glass diffusers, recessed hard-wired "can" downlights, etc.).

Energy Commission staff recommends the builder use one of the following four ways to show compliance:

1. Design and install only high-efficacy luminaires in the kitchen. This scenario meets the code requirement in the most straightforward manner.

   When kitchen lighting includes both high-efficacy sources and low-efficacy sources, the design may not meet these requirements. The second through fourth ways of showing

compliance apply to kitchens with both high- and low-efficacy sources.

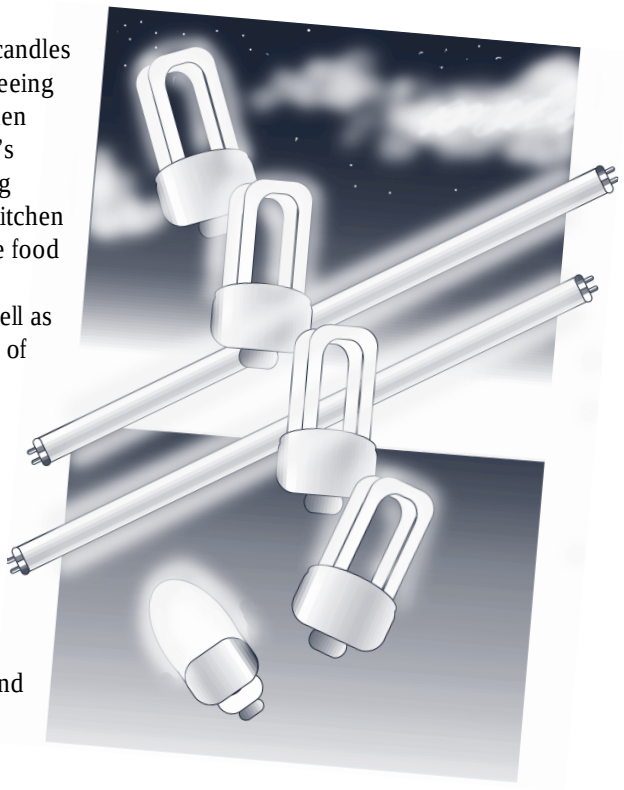
2. Provide at least 1.2 Watts per square foot (total square feet of the accessible kitchen floor and countertop areas) of light from high-efficacy sources, and insure that, in the judgment of the building department plan checker, the lamps in those fixtures produce a substantially uniform pattern of lighting on kitchen work surfaces (Please note that this is not a code requirement but is a Commission staff recommendation).

3. Make sure that at least 50 percent of the kitchen lighting wattage is high-efficacy, and that, in the judgment of the building department plan checker, the lamps in those fixtures produce a substantially uniform pattern of lighting on kitchen work surfaces (Please note that this is not a code requirement but is an option recommended by Commission staff).

4. If you wish to be certain you have provided an "energy efficient kitchen…an aesthetically pleasing appearance…sufficient light for basic kitchen tasks…while also complying with the Energy Efficiency Standards," the Energy Commission staff recommends you use the same procedures used by professional lighting designers (staff does not intend that these procedures become a standard part of builder submittals, but rather that they are used to provide the best possible solutions for builders who wish to provide high quality lighting designs).

These procedures account for the characteristics of the room and the design and location of the specific high-efficacy luminaires that will be installed as the best method to determine if there is both sufficient and uniform light. A recognized lighting authority, the Illuminating Engineers Society (IES), provides guidelines for good lighting design in their *Lighting Handbook, Reference & Application, 8th Edition.*

IES guidelines recommend that at least 30 footcandles of light be provided for seeing tasks in kitchens. Seeing tasks include, but are not limited to, the basic kitchen tasks that are described in the Energy Commission's *Residential Manual* as preparing meals and washing dishes. These tasks typically occur on accessible kitchen countertops, the tops of ranges and in sinks, where food preparation, recipe reading, cooking, cleaning and related meal preparation activities take place, as well as at the front of kitchen cabinets so that the contents of the cabinet are discernable.



To clearly demonstrate compliance with the Standards to a building department, the builder may provide a lighting layout design that includes a point-by-point illuminance grid for the high-efficacy lighting. To do this properly, this grid must account for the room geometry, fixture placement, coefficient of utilization (CU) of the fixtures, lamp lumens, lamp lumen depreciation, and reflectivity of all of the surfaces in the kitchen.

Uniform lighting assures that the minimum amount of light is available on all the work surfaces used in meal preparation and cleanup. Although the design should achieve 30 footcandles on most counter-height, horizontal work surfaces, there may be a few work surfaces where the lighting levels fall below this value and the fronts of kitchen cabinets may also be below this value. Even in these locations, the lighting level provided by the high-efficacy source should not fall below the IES-recommended lower value for non-critical seeing tasks of 20 footcandles. Parts of counters that are not work surfaces, such as a corner underneath a cabinet, may have a lighting level below 20 footcandles and still meet the requirements of the standard, because meal preparation is unlikely to occur in those areas.

Manufacturers and lighting fixture representatives can often provide such a grid for a specified design. Electrical engineers who do lighting designs and professional lighting designers also often provide designs with a point-by-point illuminance grid.

The plans should identify the type of luminaire and maximum Underwriters Laboratory (UL)-rated lamp watts for each luminaire and should include dimensions and tolerances of each luminaire so that the installer, plan checker, and field inspector can all determine when the lighting installation matches the plan checker's judgement. When calculating the kitchen lighting wattage, the builder should be certain to use the maximum UL-rated wattage for each fixture.

Energy Commission staff hopes that this information provides homeowners/builders, designers, builders, and building department personnel a better understanding of how to provide high quality kitchen lighting.

RES 00-1-Lighting